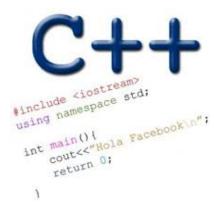
FUNCTIONS

Problem Solving with Computers-I





Functions: Basic abstraction in programs

- Keep programs DRY!
- Three steps when using functions
 - 1. DECLARE: void drawSquare(int y);
 - 2. DEFINE: Write the actual code inside the function
 - 3. CALL: drawSquare(20);

You must always declare/define functions before calling them. Demo the use of functions

Pass by value

```
#include <iostream>
using namespace std;
void bar(int x){
      x = x+5;
int main(){
   int y = 0
   bar(y);
   cout<<y;
   return 0;
```

What is printed by this code?

A.0

B. 5

C. Something else

While loops

A while loop is used to repeat code while some condition is true

```
while (BOOLEAN EXPRESSION)
   //Code
Check if the BOOLEAN EXPRESSION is true.
     * If true, the statements in loop will execute.
          * at the end of the loop, go back to 1.
     * If false, the statements in the loop will not execute.
          * the program execution after the loop continues.
```

do-while loops

A while loop is used to repeat code until some condition is no longer true

```
do{
    // Code
    // This code is executed at least once
}while(BOOLEAN_EXPRESSION);
1. Execute the code in the loop
2. Check if BOOLEAN_EXPRESSION is true.
    * If true, then go back to 1.
    * If false, then exit the loop and resume program execution.
```

C++ for loops

For loop is used to repeat code (usually a fixed number of times)

General syntax of a for loop:

```
for (INITIALIZATION; BOOLEAN EXPRESSION; UPDATE) {
     // code
     // ...
  Execute the INITIALIZATION statement.
2. Check if BOOLEAN EXPRESSION is true.
     * if true, execute code in the loop.
           * execute UPDATE statement.
           * Go back to 2.
     * if false, do not execute code in the loop.
           * exit the loop and resume program execution.
```

Continue and break

- continue;
 - can be used to stop the current iteration of a loop,
 - perform the UPDATE statement if necessary, re-check the BOOLEAN_EXPRESSION, and
 - continue with the next iteration of the loop.
- * break; can be used to break out of the **current** loop and continue execution after the end of the loop.

```
for (int i = 0; i < 10; i++) {
    if (i == 4)
        continue;
    if (i == 7)
        break;
    cout << "i = " << i << endl;
}</pre>
```

The accumulator pattern

Write a function that takes a parameter n and prints the sum of the series:

Write another function that returns the sum of the series

Formatting output to terminal

```
See pages 91 and 190 of textbook
int i = 10;
double j = 1/static cast<double>(i);
cout.setf(ios::showpoint); //Show the decimal point
cout.precision(3);
cout<<j;
What is printed by the above code?
A \cap
B. 0.1
C. 0.10
D. 0.100
E. None of the above
```

Nested for loops – ASCII art!

Write a function that prints a square of a given width

```
drawSquare(5);

* * * * * *

* * * * *

* * * * *

* * * * *

* * * * *
```

Draw a triangle

Which line of the drawSquare code (show on the right) would you modify to draw a right angled triangle

```
drawTriangle(5);

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```

```
6
    for(int i = 0; i < n; i++){ //A
        for(int j=0; j < n; j++){ //B
          cout<<"* ": //C
9
        cout<<endl;
12
     cout<<endl;
13
```

Infinite loops

```
for (int y=0; y<10; y--)
    cout<<"Print forever\n";</pre>
int y=0;
for(;;y++)
    cout<<"Print forever\n";</pre>
int y=0;
for(;y<10;);
    y++;
int y=0;
while (y<10)
    cout<<"Print forever\n";</pre>
int y=0;
while (y=2)
    y++;
```

Next time

- Automating the compilation process with Makefiles
- Intro to lab02